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The English translation for the Japanese Patent application (JP 6116073)

Invention Title: An effective method of utilizing the organic faeces excreted from living beings in a closed environment.

Key Points:

(Purpose) Provide an effective method of utilizing the human and animal faeces in a closed environment such as in universal space.

(Outline) Life activity of the flies, especially an unusual kind of fly named pref. *Sinanthropus* sp. (*Musca* ).: to produce bio-humic material (humic soil); biomass of fly larvae, and bio-gas issued from interaction between humic soil and larvae biomass. The humic soil can be used as organic fertilizer; the larvae biomass can be used as animal feedstuff; the bio-gas issued from microorganism can be used as fuel.

(Claims)

Claim 1

Life activity of the flies: to convert animal organic wastes to humic soil, larvae biomass, and bio-gas issued from interaction between humic soil and larvae biomass. As the characters mentioned above, the humic soil can be used as organic fertilizer, the larvae biomass can be used as animal feedstuff, and the bio-gas issued from microorganism can be used as fuel. This is an effective method for utilizing of the organic faeces excreted from living beings in a closed environment.

Claim 2,

An effective method of utilizing the organic faeces excreted from living beings in the closed environment, its character is using a kind of fly named pref. *Sinanthropus* sp. (*Musca* ).

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Detailed specifications of the invention:

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( As use in the industry field)

This invention is related to an effective method of utilizing the organic faeces excreted from living beings in a closed environment---especially for use in a closed environment as the universal space, to convert human and animal wastes effectively to be organic fertilizer, animal feedstuff and fuel..

002

(Prior art)

In the closed environment such as universal space, to use human and animal wastes effectively, can protect the closed environment from waste pollution, also it can convert the wastes to precious materials. But in general, for the effective use of the organic wastes, first it should be in high rate of utilization, then the converting time should be very short.

003

(Invention aim) Provide a method for utilizing the human and animal faeces in a closed environment such as universal space.

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(The Solution)

For achieving the above aim, the animal organic wastes were converted by the life activities of the fly to bio humic soil, biomass of fly larvae, and bio-gas issued from interaction between humic soil and larvae biomass. The character as mentioned above,

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the humic soil can be used as organic fertilizer; the larvae biomass can be used as animal feedstuff and the bio-gas issued from microorganism can be used as fuel.

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This invention comprises of:

In a closed environment, to process organic wastes of human and animal, then all the issuing materials will be useful and be effective materials whether in the universal space or in other closed environment,,

006

The human and animal organic wastes were processed by life activity of the flies which be named pref. *Sinanthropus* sp. (*Musca* ), it is most suitable fly for this job. They have high rate in reproduction, fast growing rate, and can be reared and produced in the organic wastes with 20%-90% humidity and 4.5-9.0 PH.

007

For this kind of fly, to be reared and grown in human and animal organic wastes, can produce a very high quality of the bio humic soil. 12.7% protein and 16.6 % cellular tissue were found in the humic soil, comparing with the original waste ( original human and animal organic wastes). The content of ammonia and phosphor acid are two times higher, and vitamin B<sub>12</sub> is 250 times higher.

008

The bio-humic material (humic soil) is odorless powder. The animal organic waste were converted to be bio humic soil by the life activity of the flies, meanwhile to produce the living biomass -fly larvae which be converted from the animal organic waste too, and contains 0f 60% protein and 30% fat. The protein contains all the

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necessary amino acids and fat in sticky liquid phase, and many of non-saturated fatty acid and semi-saturated fatty acid.

009

It has been proved, by the life activity of the flies, the infection rate of the microorganism (bacteria) in animal organic waste were greatly cut down.

010

The bio-humic material (humic soil) produced by above way, were used as organic fertilizer ( cultivated soil ), it could increase the harvest of the crop, and reduced the infection rate of the plant disease and insect pests. For example, to plant cucumber in greenhouse by using of the humic soil, the date of the cucumber issued was earlier 3-4 days than usually, the output were increased to 3.5kg/m<sup>2</sup>. If the eggs of the insect pests ( nematode ) appear in the planted soil. by using of the humic soil, this infection speed by the insect pests were obviously cut down. Furthermore, the range of the infection could be limited in minimum. The plants during the whole growth period were no problems appeared, such as dry rot, until to the harvest.

011

The humic soil was used as a compost for mushroom cultivation, as a result, the yield of mushroom was increased to 3-4 km/m<sup>2</sup> , and the harvest period was shortened to 6-9 weeks.

0012

The living materials (biomass ) were produced in same time together with the bio-humic materials, its growing is fast and could be used as feedstuff for young

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animals.

It was proved by the data from the testing animals, their biochemical index were all matched with the physiological standard, the taste of the animal meat are delicious, it is better than the usual animal meat by flavor tasting. By adding this biomass to the usual animal feedstuff, the 40% of usual feedstuff to the maximum could be saved, so as to reduce the cost and increase the output greatly.

0013

This living materials (biomass ) can be used in microorganism production also.

When it was used as an organic compost for mushroom cultivation, good results were achieved.

0014

Besides of this living materials can be used as the feedstuff for young animals,

It can be use as feedstuff for fishes too.

0015

Here is a list of ways to separate the living biomass (fly larvae ) from the humic soil. Mainly, to use the character of phototaxis that fly larvae possessed.

For example, if the fly larvae has the character of phototaxis for warm light, once this light shine on the humic soil which mixed with the living fly larvae, the fly larvae will move forward the warm light, so it can be easily separated from the humic soil. If the fly larvae has the character of phototaxis for cool light, once this cold light shine on the humic soil which mixed with the living fly larvae, the fly larvae will move forward the cool light, so it can be easily separated from the humic soil too. Besides the way of phototaxis, the ways of chemictaxis, electictaxis,

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oxygentaxis, soundtaxis can be used too.

The living fly larvae separated should be washed and cleaned, then to be used in varied ways.

0016

By life activity of the flies, the human and animal wastes can produce gas, it contains  $H_2O$ ,  $CH_4$ ,  $CO$  etc., especial one of the gas-methane ( $CH_4$ ) can be used as fuel.

In general, by life activity of the flies in a closed environment, the human and animal wastes can be converted out of the organic fertilizer; the feedstuff for animal and its young, and the gas, these materials can be effectively used.

0017

This invention offers a method for utilizing of the animal organic wastes, besides using in universal space closed environment, it can be used on earth closed environment too. For example, to treat swine feces for decontaminating and antiseptis, usually, it will take several years, but now to use this invention, it can be done within 5 days. Further more, to treat hen feces in hen farm, use this method, the hen feces can be effectively used. In the wastes after treatment, this invention could be used to control the fly spread out and their reproduction.

0018

In general, this invention can be used in closed environment both in universal space and on earth, for example, use this invention, the construction area of the animal farm can be reduced to 10-15% of usually need. By using of the organic wastes, reducing the construction area and increasing the productivity.

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019

( In real example)

Eggs of *Sinanthropus* sp. Fly 300 gram was mixed with animal feces (hen feces) 1 ton, and utilized the life activity of the flies, after 5 days, 400 kg of humic soil and up to 200 kg of biomass of fly larvae were produced. 12.7% of protein and 16.6% of cell tissue were found in the humic soil. The amount of  $\text{NH}_3$  and  $\text{H}_3\text{PO}_4$  were doubled and the amount of vitamin B12 were 250 times compared to those in the initial raw material. Also 60% of protein and 30% of fat were contained in the living biomass produced.

0020

The humic soil was used as a compost for mushroom cultivation, as a result, yield of mushroom was increased to 3-4  $\text{kg}/\text{m}^2$ , and harvest period was shortened to 6-9 weeks.

0021

To add this biomass in to the usual animal feedstuff, the 40% of usual feedstuff to the maximum can be saved,

0022

By life activity of the flies, to convert human animal organic wastes to be bio-gas which can be used as a fuel

0023

( Invention effect ) In general, this invention is related to enclosed environment such as in the universal space, to convert of the human and animal organic wastes to be

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humic soil, biomass and bio-gas, be used as fertilizer, feedstuff and fuel, so as to utilize all of the human and animal organic wastes effectively in a closed environment.

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**Fig 1,**

**This invention shows an effective method of utilizing the animal organic wastes in a closed environment.**

**Fig.1**

